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EXAMINER

MEEK, JACOB M

ART UNIT

PAPER NUMBER

2637

DATE MAILED: 07/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/925,077

Applicant(s)

HUANG ET AL.

Examiner

Jacob Meek

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13, 18 - 26 is/are rejected.
- 7) ☒ Claim(s) 14 -17, 27,28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1 – 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al (US Patent 6,307,901) in view of Lundby et al (US Patent 6,356,528).

With regard to Claim 1, Yu teaches a probability generator (see Figure 5, blocks Puncturing and Mux, Symbol Mapper, π_C , DFE, +, π_C^{-1} , and DEMUX) for generating first and second communication symbols (Figure 5, signals x_k^s , x_k^{p1} , x_k^{p2}), first and second SISO decoders (Figure 5, blocks DEC1 and DEC2) coupled to probability generator for receiving first and second communication symbols; and probability generator to SISO information received by probability generator from at least one of said SISO decoders (See Figure 5, signals B_k , P_{1k}). Yu fails to describe the coding operation of the transmitter, although it is safe to assume that encoding would be the inverse of decoding. Lundby teaches an apparatus for coding first and second channels (symbols) for transmission of a data stream on diverse channels (see Figure 2), as do many other references. It would have been obvious to one skilled in the art to implement the encoding operation at the transmitter to provide a wireless

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communications system that would provide the better BER performance that Yu teaches.

With regard to Claim 2, Yu teaches a probability generator for generating probabilities in response to SISO information received from a respective one of said SISO decoders (See Figure 5, signals B_k , P_{1k} , P_{2k}).

With regard to Claim 3, Yu teaches a probability generator for generating probabilities corresponding to first communication symbol in response to SISO information received from second SISO decoder, and for generating probabilities corresponding to second communication symbol in response to SISO information received from first SISO decoder (See Figure 7, blocks 204, 206, 208). Yu's system uses the probabilities from DEC1 and DEC2 to adjust channel parameters.

With regard to Claim 4, Yu teaches SISO information from said second SISO decoder includes probabilities that second communication symbol has possible values of second communication symbol, SISO information from first SISO decoder includes probabilities that first communication symbol has possible values of first communication symbol (See Column 4, line 46 – Column 5, line 33).

With regard to Claims 5 - 7, Yu teaches that his decoders are MAP based which are inherently SISO devices which are known in art to possess two outputs, an a priori output and an a posteriori output, and are interconnected to provide feedback to one another (see Figure 5).

With regard to Claim 8, Yu teaches at least one plurality of probabilities corresponds to first communication symbol (Figure 5, signals x_k^s, x_k^{p1}) and least one SISO decoder is second SISO decoder (Figure 5, blocks DEC2).

With regard to Claim 9, Yu teaches SISO information received second SISO decoder includes probabilities that second communication symbol has possible values of second communication symbol. (Figure 5, block DEC2 and output signals L_e^{2k}, P_{1k}).

With regard to Claim 10, Yu teaches a SISO device that produces an a posteriori output (see Column 3, line 43 – Column 4, line 34).

With regard to Claims 11 and 12, Yu teaches the connection of an a posteriori input terminal of at least one of SISO decoders is coupled via interleaver or a de-interleaver to an a priori input terminal of the other of SISO decoders (See paths shown in Figure 5 ($DEC1 > L_{e1k} > \pi > DEC2, DEC2 > L_{e2k} > \pi^{-1} > L_{ak} > DEC2$)).

With regard to Claim 13, Yu teaches the connection of an interleaver or a de-interleaver connected between one of SISO decoders and probability generator (See Figure 5, $DEMUX > x_k^s > \pi^{-1} > DEC2$).

2. Claims 18 – 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al (US Patent 6,307,901) in view of Lundby et al (US Patent 6,356,528).

With regard to Claim 18, Yu teaches a method for receiving a composite communication symbol that represents first and second communication symbols which on a bit stream and an interleaved version of the bit stream (see Figure 5, signal y_i , and blocks labeled, $+$, π_c^{-1} , and DEMUX) for each of first and second

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communication symbols, and responsive to the composite communication symbol, generating probabilities the communication symbol has possible values of the communication symbol, applying to first and second SISO decoders, (Figure 5, Block labeled DEMUX, signals x_k^s , x_k^{p1} , x_k^{p2}), SISO decoders correspond to said first and second coding operations, the probabilities that correspond to said first and second communication symbols (See Figure 5, signals B_k , P_{1k} , P_{2k}), and generating step including generating at least one of said pluralities of probabilities also in response to SISO information produced by at least one of the SISO decoders (see Figure 5, blocks Puncturing and Mux, Symbol Mapper, π_C , DFE, $+$, π_C^{-1} , and DEMUX and Figure 7). Yu fails to describe explicit use of first and second wireless communication channels corresponding to results of first and second coding operations performed by a transmitter apparatus. Lundby teaches a method for coding first and second channels (symbols) for transmission of a data stream on diverse channels (see Figure 2), as do many other references. It would have been obvious to one skilled in the art to implement the encoding operation at the transmitter to provide a wireless communications system that would provide the higher BER performance that Yu teaches.

With regard to Claim 19, Yu teaches generating step includes generating of probabilities in response to SISO information produced by one of said SISO decoders (See Figure 5, blocks Puncturing and Mux, Symbol Mapper, π_C , DFE, $+$, π_C^{-1} , and DEMUX; signals B_k , P_{1k} , P_{2k} for feedback loop and Figure 7).

With regard to Claim 20, Yu teaches generating step includes generating probabilities corresponding to first communication symbol in response to SISO information produced by second SISO decoder, and generating probabilities corresponding to second communication symbol in response to SISO information produced by first SISO decoder (See Figure 5, blocks Puncturing and Mux, Symbol Mapper, π_C , DFE, $+$, π_C^{-1} , and DEMUX; signals B_k , P_{1k} , P_{2k} for feedback loop).

With regard to Claim 21, Yu teaches second SISO decoder producing SISO information as plurality of probabilities that second communication symbol has one of plurality of possible values of second communication symbol, and first SISO decoder producing its associated SISO information as plurality of probabilities that first communication symbol has ones of plurality of possible values of first communication symbol (See Column 4, line 46 – Column 5, line 33).

With regard to Claim 24, Yu teaches one plurality of probabilities corresponds to first communication symbol (Figure 5, signals x_k^s , x_k^{p1}) and said at least one SISO decoder is said second SISO decoder (Figure 5, blocks DEC2).

With regard to Claim 25, Yu teaches second SISO decoder producing its associated SISO information as a further plurality of probabilities that second communication symbol has ones of plurality of possible values of second communication symbol (Figure 5, block DEC2 and output signals L_e^{2k} , P_{1k}).

With regard to Claim 26, Yu teaches second SISO decoder producing said further plurality of probabilities as a posteriori output probabilities (see Column 3, line 43 – Column 4, line 34).

Allowable Subject Matter

3. Claims 13 – 17, 27, and 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Included in office action are NPL documents which were not used as references in first action but appear to be highly relevant to the claimed invention and will be closely evaluated in any following actions for applicability to invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob Meek whose telephone number is (703) 305-8953. The examiner can normally be reached on 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (703) 308-7728. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMM

TEMESGHEN GHEBRETSINAE
PRIMARY EXAMINER